ROUTER TABLE FENCE SYSTEM

REFERENCE TO PROVISIONAL APPLICATION

This application claims the benefit of U.S. Provisional application Ser. No. 60/010.975, filed Feb. 1, 1996, the entire contents of which are incorporated herein by this reference.

BACKGROUND OF THE INVENTION

This invention relates to router tables and fences for use with router tables.

Because of their versatility, electric routers are very widely used in woodworking, particularly in home and small commercial shops. Such routers use a powerful electric motor in a housing to which handles are attached for holding and manipulating the tool. The motor shaft terminates in a collet adapted to receive the shank of a router bit or cutter, and a base attaches to the housing and surrounds the cutter so that a portion of the cutter may protrude beyond the base, which bears against a workpiece during use of the router. The position of the base is adjustable up and down parallel to the rotating axis of the collet and cutter, and in plunge routers the relative position of the base and router cutter can change during use of the tool in order to "plunge" the cutter into the workpiece. Electric routers are generally intended to be used by moving the router relative to a stationary workpiece, with a portion of the router base bearing against the workpiece.

Substantial additional versatility can be achieved by mounting a router in an inverted position with the router cutter protruding up through an opening in a relatively large, flat work surface to provide, in effect, a shaper. With this arrangement, a workpiece lying on top of the work surface can be manipulated relative to the stationary router and a rotating router cutter, the position of which does not move relative to the workpiece. Such router tables are commercially available in a variety of configurations, and numerous plans for homemade router tables are also available.

Many commercially available router tables are provided with fences, and fences for both commercial and homemade router tables are frequently made by users by clamping or otherwise fixing a length of wood to the router table top. Because most router table operations using a fence require that only a portion of the router cutter protrude beyond the face of the fence, provision typically needs to be made for locating the fence at least partly around the cutter. This is sometimes accomplished by machining a slot or recess in the fence within which a portion of the cutter is positioned.

Such shop-made fences, and many of the commercially manufactured fences, suffer from a variety of deficiencies. For instance, many are difficulty to position, reposition or adjust accurately. Some have insufficient strength to resist deformation during use, and many do not easily accommodate chip and dust removal accessories. It is very typically desirable to use work hold-down and safety shield accessories with router table fences, and many fences accept attachment of such accessories only with difficulty, if at all.

It is thus among the objects of the present invention to provide a router table fence that is straight, rigid, easily adjusted and which accommodates good chip escape.

It is a further object of the present invention to provide a router table fence that can be easily used in jointing a work surface.

It is another object of the present invention to provide a router table fence that will easily accommodate a wide variety of additional shop-made and commercially available accessories.

These and other objects of the present invention will become apparent from the following description of the invention, the accompanying drawings and the claims.

SUMMARY OF THE INVENTION

The router table fence of the present invention uses three nesting extrusions or spars, two of which lie under a longer third spar. By positioning the inner ends of the two lower spars adjacent to a router cutter protruding through a router table, it is possible to provide a fence, particularly when the lower spars are used with wood facings, that can be adjusted to closely surround the cutter. Lateral movement of the fence assembly adjusts the amount of cutter that contacts a work piece manipulated past the cutter while contacting the fence.

The cross sectional shapes of the spars are typically identical and are generally square, with structure that permits the upper, longer spar to rest on top of, and be attached in a manner permitting it to slide against, the lower two spars. Tee-shaped slots in each face of the spars accept fasteners that connect the spars together. Such tee-shaped slots also accept fasteners for a variety of accessories, such as hold-down devices and shields. Fence locks attach the fence to a variety of router table tops without the need for fence-receiving structures separately attached to the router table or table top. The fence locks of the present invention can be used for many top thicknesses but work particularly well with thin tops.

A micro-adjust stop can be used in cooperation with the fence locks to make very accurate and predictable adjustments in the position of the fence on a router table top.

Wood sub-fences attached to the lower fence spars can be cut by a router cutter to fit very closely around the profile of the cutter to facilitate chip removal and to reduce tear-out in the work piece. By using a shim behind one of the sub-fences in order to position it parallel to, but slightly offset from, the other sub-fence, it is possible to joint a surface of a board using a "straight" cutter.

Among the shields easily attached to the fence of the present invention is one that can be formed from a single sheet of suitable plastic like polycarbonate or acrylic with a 90° bend joining a semicircular (horizontal) portion that lies above the router cutter in use to a rectangular (vertical) portion with two screw-receiving vertical slots for receiving screws that are threaded into nuts within one of the fence tee-shaped slots to mount the shield where needed. The shield can be mounted directly against the fence when the cutter being shielded is in that location. In other instances, particularly where wood sub-fences are used, longer screws can pass through the shield and then through stand-offs that position the shield at a desirable location (above the router cutter) away from the fence.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the front and left end of the router table fence of the present invention, shown positioned on a router table top.

FIG. 2 is a perspective view of the rear and right end of the router table fence of the present invention, also shown positioned on a router table top together with the micro-adjust fence positioning stop of the present invention.

FIG. 3 is a top plan view of the fence of the present invention shown on a router table top and with two fixed stops and the dust chute of the present invention; FIG. 3A is a top plan view similar to FIG. 3 illustrating use of the micro-adjust fence positioning stop; and FIG. 3B is a

fragmentary, enlarged view of the fence of the present invention in the vicinity of the router cutter.

FIG. 4 is an elevation view of the right end of the router table fence of the present invention together on a router table top with the micro-adjust fence stop of the present invention.

FIG. 5 is a top plan view of the micro-adjust fence stop shown in FIG. 4.

FIG. 6 is a rear elevation view of a fixed fence stop of the present invention shown on a router table top edge fragment together with a fragment of the fence.

FIG. 7 is a perspective view of a portion of the face of the fence of the present invention showing a fence-mounted safety shield mounted directly to the fence.

FIG. 8 is a perspective view of a portion of the face of the fence of the present invention with wood sub-fences mounted in place and the safety shield shown in FIG. 7 shown positioned away from the fence with spacers.

FIG. 9 is a perspective view of a portion of the face and top of the fence of the present invention shown with a work hold-down mounted thereon.

DETAILED DESCRIPTION OF THE DRAWINGS

The router table fence system **10** of the present invention is illustrated in front and rear perspective views in FIGS. **1** and **2**, respectively. The system **10** includes a fence **12**, micro-adjust stop **14**, fixed stop **16**, and dust chute **18**. The figures illustrate use of the system on a relatively thin router table top **42** that is typically steel.

A safety shield **100** is shown mounted directly to the fence **12** in FIG. **7** and spaced away from fence **12** in FIG. **8**. A hold-down assembly **120** is illustrated mounted on fence **12** in FIG. **9**.

As is illustrated in FIGS. **1**, **2** and **4**, fence **12** includes an extruded aluminum upper spar **20**, extruded aluminum lower spars **22** and **24**, two fence locks **26**, sub-fences **28** and **30**, and jointing spacers **33**.

As will be appreciated by reference to FIG. **4**, the cross-sectional shapes of upper spar **20** and lower spar **22** are identical. Each spar **20** and **22** is generally a rectangle in cross-section, having four sides, opposed pairs of which are equal. As illustrated in the figures all sides of the cross-sectional shape of the spars **20** and **22** may be substantially equal, resulting in a square cross-section. A longitudinal T-slot is centered in each of the four faces of the spar. Each spar, **20** and **24** also has two upstanding ribs **34**. Upstanding ribs **34** on the top of the lower spars **22** and **24** that are received in longitudinal slots or depressions **36** in the bottom of upper spar **20**, so that lower spars **22** and **24** may slide longitudinally relative to each other while maintaining vertical alignment with upper spar **20**.

Screws **38** having a long rod-shaped head connect the upper spar **20** to lower spars **22** and **24** by passing through spar **20** and into nuts **39** located in the upper T-slot **32** in spars **22** and **24**.

Plastic end caps (not shown) on the ends of the spars prevent T-nuts from falling out of T-slots **32** and seal the lower spars **22** and **24** to improve dust removal.

As will be appreciated by reference to the figures, particularly FIG. **2**, the ability of lower spars **22** and **24** to move toward or away from each other permits upper spar **20** and lower spars **22** and **24** to be positioned in a variety of desirable locations relative to a router cutter **40**, including locations where a portion of the cutter **40** is surrounded by the fence **12**.

Fence **12** is locked in position on a router table top **42** by fence locks **26** that have a cross-sectional shape permitting a head **44** of fence lock **26** to be received in a T-slot **32** on the bottom of one of lower spars **22** or **24**. A foot **46** of fence lock **26** protrudes under router table top **42** and carries a threaded rod **48**, preferably brass, to which a gyratory handle **49** is attached in order to rotate threaded rod **48** in order to press its tip **51** against the underside of table top **42**.

Fixed stops **16** may be used to establish the position of fence **12** in order to make it possible to remove fence **12** and later return it to exactly the same position. Each fixed stop **16** is essentially a section of round rod **50** penetrated by a slot **52** that fits around an edge of router table top **42**. An axial threaded hole receives a screw **54** with a knurled head **56**.

Accurate adjustment of the position of fence **12** may be accomplished with the assistance of micro-adjust stop **14**, which is shown in side elevation and top plan views in FIGS. **4** and **5**, respectively. In order to accomplish such adjustment, one end of fence **12** is fixed in position by locking the associated fence lock **26**, and the other end of the fence is located in approximately the desired position. Micro-adjust stop **14** is then positioned on the edge of table top **42** with micro-adjust stop screw **58** end **60** in contact with the rear face **62** of fence **12**.

Micro-adjust stop **14** includes a stop body **64** that is locked in position on an edge of router table top **42** with knurled head screw **66**. Body **64** is penetrated by screw **58**, preferably brass, that has a conical or round end **60** for contact with face **62** of the fence and, on the other end, a knurled knob **68** a barrel **70** marked with a ring **72** to establish lateral position and rotational position marks **74**. A reference cursor **78** that may be a piece of acrylic or other clear plastic extends from body **64** over barrel **70**. Cursor **78** has a longitudinal mark **80** and hash marks **82** transverse to longitudinal mark **80** which are separated from each other by 0.100 inches.

The thread on screw **58** is a double-start, twenty turns per inch thread, so that one complete revolution of screw **58** advances it by 0.100 inches. With the remote end of the fence **12** clamped in position, the center point of the fence (adjacent to the router cutter **40**) will move 0.050 inches when the micro-adjust screw **58** is rotated one revolution and therefore moves by 0.100 inches the face **62** of fence **12** against which screw **58** end **60** bears. Barrel **70** is not threaded into screw **58** but rather can rotate or "float" on screw **58**. Barrel **70** is held in position by a bent washer **71** between the barrel **70** and knurled head **68** and by a knurled nut **65**. This permits barrel **70** to be rotated in order to "zero" it after contact with fence surface **62** is established. Each full rotation of screw may be read from the barrel **70** and cursor **78** markings as 0.050 inches of movement of the fence relative to cutter **40** at cutter **40**.

Wood sub-fences **28** and **30** are typically used with fence **12** by fixing them to the appropriate face of each of lower spar **20** and **22**. By sliding the sub-fences **28** and **30** toward cutter **40**, when cutter **40** is rotating, the cutter **40** will cut the ends of sub-fences **28** and **30** so that a "zero-clearance" relationship is established between the cutter and sub-fences **28** and **30**. This reduces workpiece **90** tear-out, and also facilitates dust ejection by causing most of the material removed from workpiece **90** be ejected between the opposed ends of lower spars **20** and **22**.

Such dust may be gathered with dust chute **18**, which includes a generally rectangular housing **84** that may be conveniently positioned on ferrous metal router table top **42** with powerful rare earth (such as neodymium-iron-boron) magnets located on the bottom **86** of housing **84**. Housing **84**